A Balancing Act

Reporting Category Patterns, Functions, and Algebra
Topic Exploring equivalence

Materials

- Story about equality (or comparing sets)
- Two-colored counters or beans painted on one side only
- Plastic cups
- Recording sheet

Vocabulary

more, fewer, the same, equal, equality, equal sign, = , value, balance

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Read and discuss with students a story about equal groups. Ask students what they think the word *equal* means? If they need prompting, ask them to think about a time when they had to divide something into two *equal* parts.
2. Show students 6 counters in two different colors—for example, 4 red and 2 yellow. Explain that you are going to put all 6 counters in a cup and then shake them out. Have students count with you as you drop each counter into the cup one by one. Ask a student to come up, shake the cup, and pour the counters out.
3. Have students count how many red counters there are (4) and how many yellow (2). Ask, "Are there still 6 counters altogether? How can we be sure?" (Count them.) Record on the board the equation 4 + 2 = 6. Ask students whether anyone can explain how these numerals relate to the counters they see. Ask what the equal sign means. Confirm that the equal sign tells us that the numbers on each side of it have the same value or are equivalent. Ask someone to come up and prove that the numbers on each side are equivalent, using the counters.
4. Replace one of the yellow counters with a red one. Ask another volunteer to come up and count as he/she puts the 6 counters back in the cup. Have the volunteer shake the counters and pour them out again. Again, ask how many red counters there are (5) and how many yellow (1). Ask, "How many counters are there altogether? How can we be sure?" Ask what number sentence you should write to represent what they see (5 + 1 = 6). Ask them what the equal sign means here. Ask your volunteer to prove 5 plus 1 is equal (or equivalent) to 6, using the counters.
5. Repeat counting, shaking, and pouring the 6 counters until you feel students are ready to work on their own (or with a partner). Then, pass out a different color combination of 6 counters and a cup to each student (or pair), and have them count, shake, and pour the

counters on their work space. Have students record in their journals the different combinations they were able to find, making sure they use the equal sign in their equations.

6. After students have found all different combinations of 6, introduce the notation 6 = 6, and discuss. Follow this discussion with the question, "Does 5 + 1 = 4 + 2?" Explore and discuss students' responses.
7. When students have finished, have them bring their math journals to the front and share their equations with the class.

Assessment

- **Questions**
  - "Do you think the class found all the combinations of counters that equal 6? How can you be sure?"
  - "Do you think you can find more combinations that equal 4 or more combinations that equal 8? Why? How can we find out?"
- **Journal/Writing Prompts**
  - "Write about what you discovered today when you were working with your group of counters."
  - "Look at the number sentences 4 + 3 = 7 and 3 + 4 = 7, and explain how they are different. Explain how they are the same. Draw and write these two number sentences. You may use counters to help you, if you wish."
- **Other**
  - Circulate as students work, and note those who are struggling and those who are working with ease. Are any students noticing or discussing how 1 + 5 and 5 + 1 have the same numerals in their number sentences? Are they making any observation or connections?

Extensions and Connections (for all students)

- Place 7 counters of two different colors (e.g., 3 yellow and 4 red) in the cup, shake, and pour out. Record the number of yellow and the number of red counters showing, but do not use the equal sign or include the sum. Replace one of the yellow counters with a red one, and return the counters to the cup. Shake and pour a second time. Record the number of yellow and the number of red counters showing now. Ask students whether the total number of counters poured first equals the total number poured second. Ask, "How do you know? Can you prove it? How can you write the number sentence showing the relationship between the numbers of the first and second pours?" (3 + 4 = 2 + 5).
- Provide counters and cups in your math center to allow students time to explore the different combinations they can find for a given number of counters.

Strategies for Differentiation

- Begin with a small number of counters, and work up to larger numbers as students are ready.
- Provide students with numbered necklaces so they may represent, by standing side by side, the relationship of two expressions of equal value.